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Leveraging the SoloLearn application for enhanced python programming skills

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ABSTRACT

This study aims at how effectively polytechnic students can learn Python programming with the help of the SoloLearn platform. A smartphone application called SoloLearn provides a variety of coding courses, including Python. It offers quick courses, interactive tests, real-time code execution, and a community-driven learning methodology. Using questionnaires, the effect of SoloLearn on interest, comprehension, and Python competency has been evaluated among polytechnic students. Our findings reveal that SoloLearn enhances student engagement due to its gamified elements like points, badges, and peer challenges also create a more engaging learning environment. The instant feedback and hands-on coding exercises improve students' understanding and retention of Python concepts. SoloLearn proves to be an effective supplementary tool for polytechnic students learning Python. It provides an approachable and engaging educational experience. Its first mobile design appeals particularly to students who require convenience and flexibility.

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Introduction

Python is a versatile and widely used programming language, known for its simplicity and readability. As the demand for Python programmers continues to grow, it is crucial to identify effective strategies to enhance Python programming skills.

Sololearn is a great online learning platform with both a desktop version and a mobile learning platform with interactive text-based courses on programming languages, web development, machine learning, data science, and responsive web design Jamie Ararao (2023). Sololearn is a great platform to learn programming disciplines, especially if you are a newbie in this programming field. The self-paced lessons will teach the basic concepts and gradually advance your programming knowledge. If you are interested in a tech career, this educational platform will give you a solid foundation.

Learning on Sololearn is worth it, especially if you are a beginner. These courses will improve your programming skills and real-life experiences. Learning from the experience with Sololearn courses was amazing. You may access Sololearn courses via their mobile app. Sololearn is a good mobile learning platform too Louie Lorenz Flores (2024)

Interactive learning platforms like SoloLearn, Codecademy, and Coursera have gained popularity for teaching programming languages, including Python. These platforms leverage interactive elements such as coding exercises, quizzes, and real-time feedback to enhance learner engagement and retention. According to Moreno and Mayer (2017), interactive elements in educational software significantly improve learning outcomes by providing immediate feedback and opportunities for practice, which are crucial for mastering programming concepts.

Gamification, the incorporation of game-like elements in non-game contexts, is a prominent feature in many learning applications. SoloLearn, for instance, uses points, badges, and leaderboards to motivate learners. Research by Deterding et al. (2011) suggests that gamification increases motivation and engagement, leading to better learning outcomes. By making the learning process more enjoyable, these elements encourage consistent practice and perseverance, essential for mastering Python programming.

One of the significant advantages of using applications for learning Python is the flexibility they offer. Learners can access content anytime and anywhere, accommodating diverse schedules and learning paces. A study by Means et al. (2013) found that online learning environments are as effective as traditional classroom settings, with the added benefit of flexibility. This accessibility ensures that learning is inclusive and can reach a broader audience.

Effective programming education requires practical, hands-on experience. Learning applications often include integrated coding environments, such as SoloLearn's Code Playground, where learners can write, test, and debug code. Kolb's (1984) experiential learning theory underscores the importance of learning through experience. These practical exercises help learners apply theoretical knowledge, reinforcing their understanding of Python programming.

Research on teaching methods and programming environments has been conducted to solve the difficulties that beginners experience in the programming process Wing, J.M (2006). As error feedback is one of the causes of difficulties for beginners in the programming process McCall, D et al. (2019), Scratch, which is learned through trial and error, has been used to educate beginners regardless of school level Xinogalos et al. (2017). University students have also shown high satisfaction with their success in programming Cárdenas-Cobo, J. et al. (2021).

Method

A survey was conducted on 74 undergraduate polytechnic students from Politeknik Muadzam Shah using stratified proportionate random sampling. A stratified random sample divides the population into strata or smaller groups, based on homogeneous groups (shared characteristics). The population of the study was all students enrolled in python programming subject in Diploma Digital Technology at Politeknik Muadzam Shah, and a sample of 68 students participated in the study. The participants in this study were students who taken Python Programming subject. Python Programming subject uses a fully practical approach to master programming skills.

Since there was a known population, the sample size was chosen based on all students enrolled in python programming subject on the semester 2 2023/2024. A total of 23 questionnaires were answered via google form which indicated 91.8% response rate. This fulfilled the acceptable response rate of 30% recommended by Sekaran (2000). Data analysis was carried out using descriptive statistics. The tools used to gather data for the study were questionnaires adopted by Kim, Y. and et al (2023).

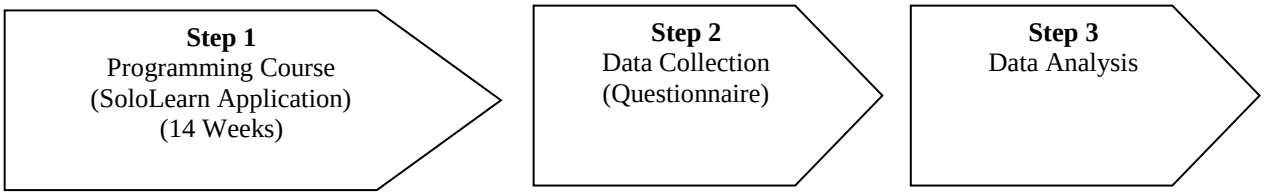

Figure 1 <Study Procedure>

Questionnaires were composed of 23 items that evaluate effectiveness and impact of SoloLearn Application in programming learning environment and positive perceptions of programming among students. 8 items in the instrument associated Understanding of Programming Instructions subcategory, 5 items associated with Usage Confidence, and 3 other items were associated with usefulness subcategory. Meanwhile category positive perceptions of programming consist of 7 items.

The Likert scale, made up of strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5) was adopted on the research tool(questionnaire) to get suitable feedback from the respondents. The items scores were analysis to get percentage and mean for each subcategory.

Results and Discussions

Data collected were pulled together with strongly agree, agree classified as agree, while strongly disagree and disagree were classified as not agree. Respondents were distributed across JTMK department in the polytechnic, with the majority having basic prior exposure to programming from semester 1.

Table 1 < Frequency and Mean for Programming Learning Environment >

Category	**Subcategory**	**Acceptance Level**		**∑**
		Agree	**Not Agree**	
Programming Learning Environment	Understanding of Programming Instructions	B6- 68	0	4.27
		B7- 68	0	4.27
		B8- 66	2	4.32
		B9- 66	2	4.32
		B10- 67	1	4.09
		B11- 67	1	4.09
		B12- 68	0	4.27
		B13- 66	2	4.32
		Total		**4.17**
	Usage Confidence	B1- 51	17	3.397
		B2- 58	10	3.968
		B3- 64	4	4.08
		B4- 63	5	3.15
		B5- 67	1	3.07
		Total		**3.53**
	Usefulness	B14- 50	18	3.10
		B15- 50	18	3.10
		B16- 61	7	4.44
		Total		**3.55**
	Total			3.75

The findings from Table 1 illustrate students' perceptions of the programming learning environment facilitated by the SoloLearn application, grouped into three key subcategories: Understanding of Programming Instructions, Usage Confidence, and Usefulness. For the Understanding of Programming Instructions, a consistently high level (4.17) of agreement was observed across all areas. Between 66 to 68 respondents agreed with the statements. The mean scores for usage confidence are 3.53 and usefulness resulting in an overall mean of 3.75.

This indicates that most students found SoloLearn effective in enhancing their comprehension of Python programming concepts. The interactive tutorials and instant feedback likely contributed to this strong understanding. Therefore, it can be considered that using the programming environment and increasing confidence made programming perceptions more positive.

The results from Table 1 highlight students' positive perceptions of programming after using the SoloLearn application. The overall responses indicate a high level (4.31) of agreement across all subcategories, with most students showing favorable attitudes toward learning programming through the mobile platform. These high mean values suggest that most students developed a more positive view of programming because of engaging with SoloLearn. The platform not only supports skill acquisition but also reshapes students' mindset, making programming feel more accessible and enjoyable. This positive perception is crucial in building long-term interest and engagement in coding among polytechnic students.

In programming education for beginners, it is important for beginners to maintain a positive perception throughout their learning process. In other words, an increase in learning efficacy is expected to have a positive effect on motivation to continue learning Tavares, P. C. et al (2017) and Yong, S.T. et al. (2022). Accordingly,

hybrid-based programming environments studies have been conducted wherein text-based programming was performed in block-based programming environments Seraj, M. et al. (2019) and Deng, W. et al. (2020).

Table 2 < Frequency and Mean for Positive Perceptions of Programming >

Category	**Subcategory**	**Acceptance Level**		**∑**
		Agree	**Not Agree**	
Positive Perceptions of Programming		D1- 66	2	4.32
		D2- 67	1	4.40
		D3- 66	2	4.32
		D4- 66	2	4.14
		D5- 68	0	4.27
		D6- 64	4	4.30
		D7 - 65	3	4.43
		Total		**4.31**
Total				4.31

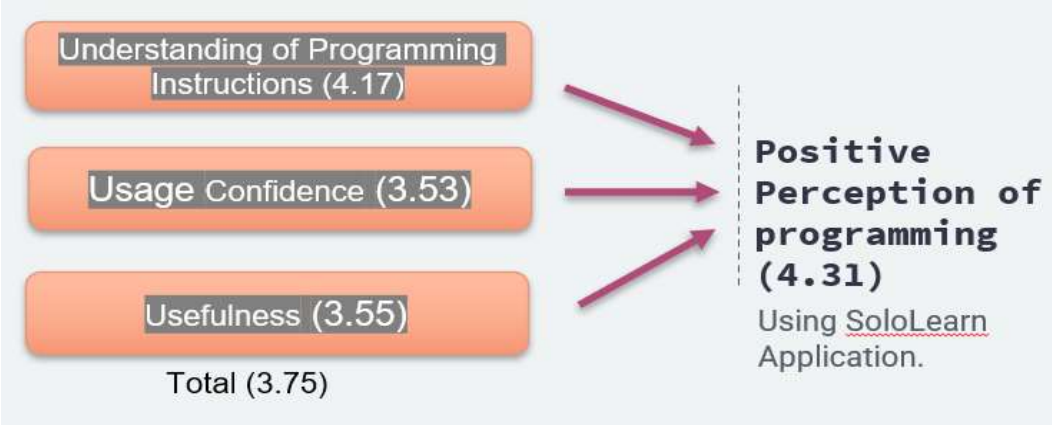

Figure 2 <Positive Perception of Programming>

Therefore, from the results it can be concluded that the use of the programming environment, coupled with increased confidence, contributed to a more positive perception of programming. The findings indicate that the SoloLearn application enhanced students' comprehension of programming instructions, strengthened their confidence in usage, and improved perceptions of its usefulness. Collectively, these factors demonstrate that interactive mobile-based learning platforms can serve as an effective medium for cultivating interest, motivation, and sustained engagement in programming education.

Conclusions

With the increasing importance of programming education, many studies have been conducted to support beginners. Despite various studies on programming environmental factors, learning motivation, learning effectiveness, and satisfaction, the challenges faced by programming beginners remain an issue that needs to be addressed in programming education.

Therefore, this study was conducted to identify factors associated with positive perceptions of programming in beginners. There is a need for an environment that provides learners with various programming languages. It is necessary to provide environments for programming in not only Python but also C, Java, and other languages allowing users at different school levels the opportunity to choose a programming language that is suitable for their level. This study is significant in that it demonstrates the need for different approaches to programming education, considering learning dispositions based on school levels, even for the same group of programming beginners.

Most students showed positive response and good competencies or skills, well to write programming code when using SoloLearn Application. Therefore, the usage of new approaches in online teaching and learning can fulfil and enhance the expected progress in learning performance in Python Programming subject with no obstacles experienced by students. The new era has provided an excellent opportunity to pave the way for digital learning.

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